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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/781,833	02/12/2001	Benjamin N. Eldridge	276440-4	8560
27521	7590	12/17/2003	EXAMINER	
N. KENNETH BURRASTON P.O. BOX 45898 201 SOUTH MAIN STREET, SUITE 1800 SALT LAKE CITY, UT 84145-0898			ALANKO, ANITA KAREN	
			ART UNIT	PAPER NUMBER
			1765	

DATE MAILED: 12/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/781,833

Applicant(s)

ELDRIDGE ET AL.

Examiner

Anita K Alanko

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 9/11/03 amdt.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-68 is/are pending in the application.
- 4a) Of the above claim(s) 30-39, 42 and 53-55 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-29 40-41, 43-52 56-68 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 9/8/03.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

***Election***

Claims 1-29, 40-41, 43-52 and 56-68 (species 1-A, 2-E, 3-B) have been examined.

Claims 30-39, 42 and 53-55 are withdrawn from consideration. Claim 42 is not examined since it depends on claim 39, which is not examined.

***Claim Objections***

Claims 26, 45 and 47 are objected to because of the following informalities: claim 26 is incomplete and claims 45 and 47 have typographical errors ("patterning"). Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

Claim 7 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claim 7, the members "photoresists" and "photopolymers" of the Markush group overlap, therefore the claim is unclear because it is unclear how the members are the same or different.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-29, 40-41, 43-52, 56-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cunningham et al (US 5,688,699) in view of Vaganov (US 6,406,636 B1).

Cunningham discloses a method for forming a microelectronic spring structure, the method comprising:

depositing a layer of sacrificial material 42 over a substrate 12 (Fig.2B);

forming at least one molding surface in the sacrificial material (the process of patterning the sacrificial material 42 to form openings for contacts 28, Fig 2D);

depositing a layer of resilient material 32 over the at least one molding surface of the sacrificial material (Fig.2F);

thereafter, patterning the deposited resilient material to define a spring structure 32 in the at least one molding surface (col.3, lines 50-53); and

removing at least a portion of the sacrificial material 42 under the spring structure (Fig.1, col. 4, lines 27-29).

The elected species, species 1-A, is drawn to the method of forming the molding surface by pressing a stamping tool. Cunningham does not disclose to use a stamping tool to pattern the sacrificial material. Cunningham discloses to use conventional photolithographic techniques (col.3, lines 27-32) to pattern the sacrificial material, and thereby mold the sacrificial material. Vaganov teaches that useful, known, functionally equivalent techniques to etching (as is used in photolithographic techniques) is to use molding or stamping to form microprofiles in materials (col.13, lines 52-59, claim 8). It would have been obvious to one with ordinary skill in the art to use stamping to pattern the sacrificial material in the method of Cunningham because Vaganov

teaches that this is a useful alternative and also functionally equivalent technique for patterning layers.

As to claim 2, Cunningham discloses (Figure 2D) an opening in layer 42 to contact 28.

As to claim 3, Cunningham discloses that sacrificial material under a spring contact structure may comprise polyamide (col. 3, line 26). Cunningham fails to disclose that a plurality of layers can be deposited. In general, the transposition of process steps or the splitting of one step into two, where the processes are substantially identical or equivalent in terms of function, manner and result, was held to not patentably distinguish the processes. *Ex parte Rubin* 128 USPQ 440 (PTO BdPatApp 1959). It would have been obvious to one with ordinary skill in the art to deposit plural layers as the sacrificial layer in the modified method of Cunningham because the splitting of one step into two steps is obvious since the same final product results when the sacrificial layers are removed.

As to claims 4, 6-7, and 9, Cunningham discloses that the sacrificial material comprises polyamide, which encompasses a photoresist. Cunningham discloses that the polyamide is spun-on, which is conventionally followed by a curing/hardening step to form the final thin film.

As to claims 5 and 8, the patterning in the method of Cunningham encompasses removing a selected portion of the sacrificial material from the substrate (the area for the future contact 28).

As to claims 10-11, Vaganov does not disclose the details of the molding or pressing step. It would have been obvious to one with ordinary skill in the art to displace a portion of the curable material in the modified method of Cunningham because pressing processes with tools conventionally do that.

As to claims 12-13 and 40, Cunningham discloses to use photolithography and reactive-ion etching to pattern the sacrificial layer (col.3, lines 28-30), which is conventionally anisotropic. In addition, Figure 2D depicts the etching as anisotropic.

As to claims 14, Vaganov teaches that it is useful to also use a combination of etching and molding or stamping steps (col.13, lines 52-59). Anisotropic and isotropic etching are conventional etching techniques. It would have been obvious to one with ordinary skill in the art to include anisotropic or isotropic etching in the modified method of Cunningham because Vaganov teaches that a combination of steps can be used for microprofiling, for which a combination of anisotropic or isotropic etching and stamping is obvious in order to precisely form a molding surface.

As to claim 15, Cunningham discloses to deposit a mass of metallic material 32 (chromium and nickel, col.3, lines 46-50) over the at least one molding surface.

As to claim 16, Cunningham discloses to use lift-off to pattern the metallic material, not to pattern by depositing through a patterned mask. Examiner takes official notice that depositing through a patterned mask is a conventional technique for patterning layers. It would have been obvious to one with ordinary skill in the art to deposit through a mask in the modified method of Cunningham because it is a conventional technique for patterning and is functionally equivalent to lift-off.

As to claims 17, 19 and 22, Cunningham discloses to deposit a chromium seed layer that is 100 Å thick (col.3, line 47), which is within the range cited.

As to claims 18 and 24, Cunningham does not disclose how the chromium is deposited. However, it would have been obvious to one with ordinary skill in the art to deposit the

chromium seed layer by sputtering or through a patterned mask in the modified method of Cunningham because they are conventional techniques for depositing seed layers.

As to claims 20-21, Cunningham does not disclose alternative seed layers such as gold or copper. However, it would have been obvious to one with ordinary skill in the art to deposit the a gold or copper seed layer by sputtering in the modified method of Cunningham because it is a conventional material and depositing technique for seed layers.

As to claim 23, Cunningham does not disclose to deposit the seed layer at different thicknesses. However, the thickness effects the ease of electroplating and properties of the final product. It would have been obvious to one with ordinary skill in the art to deposit the seed layer to the thickness cited in the modified method of Cunningham because the thickness appears to reflect a result-effective variable that can be optimized. See MPEP 2144.05 IIB.

As to claims 25-26 and 27, Cunningham discloses that the resilient material comprises nickel (col.3, line 47), which is electrically conductive, but not disclose how it is deposited. It would have been obvious to one with ordinary skill in the art to deposit the resilient material by electroplating in the modified method of Cunningham because it is a conventional deposition technique for metallic layers.

As to claims 28-29, Cunningham discloses second depositing a plurality of materials including a metallic material 32 and an insulating material 22 (col.3, lines 36-37).

As to claim 41, as the method of Cunningham is conducted across the surface of the wafer, the area is expected to encompass the range cited.

As to claim 43, examiner takes official notice that treating polymers with a plasma to render it electrically conductive is conventional. It would have been obvious to treat the

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sacrificial material polymer with a plasma to render it electrically conductive because it is a useful technique for forming conductive layers.

As to claims 44-45 and 47, Cunningham discloses to contour perpendicular to the substrate by layer (Fig.2B) and across the width and length of a beam portion of the spring structure (Fig.2D).

As to claims 46 and 48, Cunningham discloses that the contour for the contact is a generally U-shaped, concave structure (Fig.2F).

As to claims 49 and 52, Cunningham discloses a base end, tip end and a continuous length between the base and tip as cited (Fig.2F).

As to claims 50-51, Cunningham discloses to have an L-shape and two parallel arms (Fig.2F).

As to claims 56-67, the cited pressing and deposition steps are well known patterning techniques which would be obvious to use in the modified method of Pedersen to form a desired contour.

As to claim 68, Cunningham discloses patterning by removing a portion of the resilient material (col.3, lines 50-53).

### ***Response to Arguments***

As to the Pedersen rejections, applicant's arguments are persuasive. The objection to the specification and the 112 rejection over claims 4 and 25 are withdrawn. The claims are now rejected over newly cited Cunningham.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

#### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anita K Alanko whose telephone number is 571-272-1458. The examiner can normally be reached on Mon, Tues & Fri: 8:30 am-5 pm; Wed&Thurs: 10 am-2 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

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*Anita K. Alanko*

Anita K Alanko  
Primary Examiner  
Art Unit 1765